Appl. No. 10/685,743
Amdt. sent June 2, 2005
Reply to Office Action of May 18, 2005

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1   1.   (Previously presented): A computer-implemented method of duplicating

2   data in a system provided with a first storage subsystem group, comprising a first plurality of

3   storage subsystems, and a second storage subsystem group, comprising a second plurality of

4   storage subsystems,

5   wherein the storage subsystems of the second storage subsystem group store

6   copies of the data of the first storage subsystem group,

7   wherein each of the storage subsystems of the first storage subsystem group

8   writes the data into a storage device of the first storage subsystem group, assigns a serial number

9   and a time, and transfers the data through a transmission line to at least one of the storage

10   subsystems of the second storage subsystem group, and

11   wherein a plurality of data received by each of the storage subsystems of the

12   second storage subsystem group is arranged sequentially based on the serial numbers, and

13   wherein an oldest time is decided from among a plurality of latest times by each

14   of storage subsystems of the second storage subsystem group, each latest time being related to

15   the plurality of data arranged based on the serial numbers, each latest time being communicated

16   for comparison between at least some of the storage subsystems of the second storage subsystem

17   group, and

18   wherein data that is related to a time not later than the decided oldest time are

19   selected as data to be written to the storage device of each of the storage subsystems of the

20   second storage subsystem group,

21   wherein one of the storage subsystems of the second storage subsystem group is a

22   predetermined storage subsystem and each of the storage subsystems, other than the

23   predetermined storage subsystem, notifies the predetermined storage subsystem of a latest time

24   of data from the other storage subsystems, and the predetermined storage subsystem decides the

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25   oldest time from among the latest time of data in each of the other storage subsystems and a

26   latest time of data stored in the predetermined storage subsystem.

1   2.   (Original): The method of duplicating data as claimed in claim 1, wherein

2   said transmission line that connects a storage subsystem which belongs to said first storage

3   subsystem group and a storage subsystem which belongs to said second storage subsystem group

4   comprises a Storage Area Network (SAN).

1   3.   (Original): The method of duplicating data as claimed in claim 1, wherein

2   a clock providing said time to each of the storage subsystems of said first storage subsystem

3   group is corrected by an external source of time information.

1   4.   (Previously presented): The method of duplicating data as claimed in

2   claim 1, wherein connections among the storage subsystems of said second storage subsystem

3   group are made by loop transmission lines, and wherein each of the storage subsystems informs

4   other storage subsystems of a latest time for comparison from among times associated with

5   individual data copies stored within said storage subsystem, and thereupon, an oldest time is

6   determined from among the latest times of each of the storage subsystems in said second storage

7   subsystem group.

     5.   (Canceled)

1   6.   (Original): The method of duplicating data as claimed in claim 1, wherein

2   a plurality of storage subsystems of said first storage subsystem group transfer each of writing

3   data to one of the storage subsystems of said second storage subsystem group, the one of the

4   storage subsystems of the second storage subsystem group selects the latest time that is given to

5   each of said storage subsystems of the first storage subsystem group and decides the oldest time

6   from among the selected latest times.

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1   7.   (Original): The method of duplicating data as claimed in claim 1, wherein

2   a storage device of said storage subsystem is comprised of volumes and a volume pair is

3   comprised of a volume of the first storage subsystem group and a volume of the second storage

4   subsystem group, the storage subsystem which belongs to the first storage subsystem group

5   controls a start and a stop of data transmission to the second storage subsystem group with the

6   unit of each of the volume groups comprised of a plurality of volume pairs.

1   8.   (Previously presented): A data duplicating system, comprising:

2   a first storage subsystem group comprising a plurality of first storage subsystems;

3   and

4   a second storage subsystem group comprising a plurality of second storage

5   subsystems that store copies of the data of the first storage subsystem group,

6   wherein each of the first storage subsystems comprises a means of writing data to

7   a storage device thereof, a means of giving a serial number and a time to said data, a means of

8   transmitting said data with the serial number and the time through a transmission line to one of

9   the second storage subsystems,

10   wherein each of the second storage subsystems comprises a means for arranging

11   the received plurality of data in sequence based on said serial numbers, a means for deciding an

12   oldest time from among a plurality of latest times associated with the second storage subsystems

13   by comparing the latest time from at least some of the second storage subsystems with other

14   second storage subsystems, and a means of writing the data with a time not later than a decided

15   oldest time to a storage device of each of the second storage subsystems,

16   each latest time in a second storage subsystem being related to the times of the

17   plurality of data arranged based on the associated serial numbers,

18   wherein one of the second storage subsystems is a predetermined storage

19   subsystem and each of the second storage subsystems, other than the predetermined storage

20   subsystem, notifies the predetermined storage subsystem of a latest time of data, and the

21   predetermined storage subsystem decides the oldest time from among the latest time of data from

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22   the other second storage subsystems and a latest time of data stored in the predetermined storage

23   subsystem.

1   9.   (Original): A data duplicating system as claimed in claim 8, wherein said

2   transmission line comprises a Storage Area Network (SAN).

1   10.   (Original): A data duplicating system as claimed in claim 8, wherein each

2   of the first storage subsystems is provided with a means for correcting a clock for referring to

3   said time from external time information.

1   11.   (Original): A data duplicating system as claimed in claim 8, wherein

2   connections among the second storage subsystems are made by a loop transmission line and each

3   of the second storage subsystems transfers an older of its latest time and a latest time received

4   from another of the second storage subsystems to an adjacent one of the second storage

5   subsystems, the data duplicating system further comprising means of deciding the time

6   transferred by the second storage subsystem and returned to the second storage subsystem as said

7   oldest time.

1   12.   (Original): A data duplicating system as claimed in claim 8, wherein one

2   of the second storage subsystems is configured as a master storage subsystem, each of the second

3   storage subsystems other than said master storage subsystem comprises a means of notifying its

4   latest time to the master storage subsystem and said master storage subsystem is provided with

5   the means of deciding said oldest time from among its latest time and the latest times received

6   from second storage subsystems other than said master storage subsystem.

1   13.   (Original): A data duplicating system as claimed in claim 8, wherein a

2   plurality of the first storage subsystems are comprised to transfer each of the writing data to one

3   of second the storage subsystems and said one of the second storage subsystems comprises a

4   means of selecting a latest time given to each of said first storage subsystems and a means of

5   determining an oldest time from among the selected latest time as the candidates of said oldest

6   time.

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1   14.   (Original): A data duplicating system as claimed in claim 8, wherein the

2   first and second storage subsystem groups each comprises a plurality of volumes, wherein a

3   volume of the first storage subsystem group is a source of copying and a volume of the second

4   storage subsystem group is destination of copying and together form a volume pair, wherein one

5   of the first storage subsystems is provided with a means for controlling the start and stop of the

6   data transmission between volumes of a volume pair.

   15-22. (Canceled)